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Theoretical-Experimental Method for Determining the Parameters of Damping Based on the Study of Damped Flexural Vibrations of Test Specimens. 3. Identification of the Characteristics of Internal Damping

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Abstract

© 2014, Springer Science+Business Media New York. The logarithmic decrement of damped vibrations of materials is determined using a theoretical-experimental method. The method is based on measuring the deflection amplitudes of flat cantilever test specimens during their damped vibrations according to the first resonance mode, on the description of internal viscous friction of materials by known models both in linear and nonlinear approximations, on theoretical determination of the aerodynamic constituent of damping, and on a theoretical investigation of damping vibrations of test specimens by employing equations of motion constructed with a corresponding degree of accuracy and pithiness. To determine the vibration decrement of a soft material in tension-compression, sandwich test specimens with a steel core and external layers made of the soft material were used, but in transverse shear — with a core made of the soft material and steel external layers. A considerable effect of external aerodynamic forces on the vibration decrement of the specimens is revealed. Two methods for identification of the parameters of internal damping are proposed on the basis of data of the experimental investigations performed.

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Keywords

aerodynamic damping, experimental investigation, flexural vibrations of plates, identification of the parameters of internal damping, internal damping, theoretical-experimental method